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shrivelled. Lot II. was from the main planting, made in the latter part of April, and dug and stored in September. The tubers were quite firm, and had sprouted but moderately. Lot III. was seed from a second crop grown in 1889 in the following way. A few hills each of several sorts, from the plat which produced the seed of lot I., were dug July 11, and the potatoes planted the same day on ground that had been cleared of early peas. These gave a light yield of tubers of even size and of very fine quality. When taken from the cellar for planting they were as firm and free from sprouts as when stored.

Three pounds of each of the above lots were cut to three-eye pieces, and planted March 18. With one exception, the sorts in lot III. were from five to eight days later than the others in coming up, while between lots I. and II. no difference could be noted.

The vines of lot III., when they came, were much stronger than the others, and in a few weeks overtook and outgrew the other lots, making a much more vigorous and heavy stand.

The date of blooming, though not varying uniformly on the whole, favors the vigorous plants of lot III. for earliness, and shows that the comparatively weak and slender plants of lot I. bloomed later, or in three cases failed to perfect any bloom.

The date at which they afforded potatoes of table quality did not vary appreciably in favor of either, but the product, both in quantity and quality, was largely in favor of lot III.

While the product of lot II. was not, in all cases, much ahead of lot I. in weight, the percentage of marketable tubers was greater, and these were of greater average size.

Summarizing the results of this trial, it seems, first, that nothing is gained in earliness by the use of second-crop seed; second, that there is a positive gain in amount of product, as well as size of tubers, over that of first-crop seed grown in the same locality; third, that firm, well-kept, unsprouted seed is better than that which is sprouted and shrivelled, giving a heavier product and of better size and quality. These inferences may not be conclusive, but seem to be fairly deducible from the above results.

Still further to test the practicability of growing the second crop of potatoes in one season, five pounds of seed of each variety in lot III., as above mentioned, were dug July 23, and planted the same day, cut in halves. These came up rather unevenly, the same fault having been noticed in the previous trial. The product was of unusually fine quality, and the yield a very good one, when it is considered that potatoes of ordinary planting were almost a failure in that section of the country.

ENTOMOLOGICAL OBSERVATIONS AND EXPERIMENTS.

THE reports of the six permanent field agents of the Division of Entomology of the Department of Agriculture are included in a bulletin just issued from the government printing office at Washington. These reports are printed in full, though they are little more than summaries of the work in general performed by each agent. Special reports upon specific subjects have from time to time been sent in by special direction, and those have been published in *Insect Life*.

Mr. Lawrence Bruner, who last year reported upon the insects injurious to young trees on tree claims, has the present season devoted much of his attention to insects affecting, or liable to affect, the sugar-beet, a crop of growing importance in Nebraska, the State in which he is located. Although but one season's collecting has been done, some sixty-four species have been observed to prey upon this crop. As is shown by the report, nearly all of these can be readily kept in subjection by the use of the kerosene emulsion or the arsenites.

Mr. D. W. Coquillet's report, from California, is mainly devoted to methods and apparatus for the destruction of scale-insects by means of fumigation. The experiments were aimed at the red scale, which is one of the most difficult to treat with washes. He describes the simplified tents and the rigging which enables them to be used rapidly, and shows the advantage of excluding the actinic rays of the light. Judging from recent California newspapers, the use of this method of fighting scale-insects is rapidly increasing, and the comparatively expensive apparatus is already owned by a large number of fruit-growers. This improved method

is the legitimate outgrowth of experiments which were instituted by the department at Los Angeles in 1887, and possesses the advantage over spraying that it can hardly be done in a slovenly manner. If used at all, its effects are nearly complete.

Mr. Albert Koebele, while reporting upon a number of interesting fruit pests, notably the tent caterpillars of the Pacific slope, and a noctuid larva which destroys the buds of certain fruit trees, devotes most of his report to the description of certain tests, which Professor Riley, the government entomologist, directed him to make with different resin compounds against the grape phylloxera in the Sonoma Valley during September and October of the past year. The results have been fully as satisfactory as were anticipated, and the economy of the process is very striking, labor being practically the only expense.

Miss Mary E. Murtfeldt reports upon the insects of the season in eastern Missouri, and also gives the results of experiments which she has made with certain insecticides submitted to her from the office of Professor Riley for trial. She also presents descriptions of four *Microlepidoptera*, which are new in the rôle of feeders upon the apple.

Professor Herbert Osborn reports upon the insects injurious to forage-crops, meadows, and pastures in Iowa. His report last year was mainly taken up with the consideration of the leaf-hoppers, to which he gives some further consideration this year, adding some notes on locusts and crickets. He presents also a series of miscellaneous observations.

Mr. F. M. Webster of Indiana devotes his report mainly to the Hessian fly, discussing the number and development of broods, the effect of the larvæ upon plants, the effect of the weather on the development of the fall brood, and preventive measures. He also gives some notes upon three of the species of plant-lice found commonly upon wheat.

NOTES AND NEWS.

THE Rev. J. Hoskyns-Abrahall writes to *Nature* that on June 10, about 10.30 P.M., near Woodstock (England), he saw what he describes as "a beautiful phenomenon." "Suddenly," he says, "at the zenith, east of the Great Bear, shone forth a yellow globe, like Venus at her brightest. Dropping somewhat slowly, it fell obliquely southward. As it passed in its brilliant career, it lighted up its dusky path with a glorious lustre. When it had descended about half-way down toward the horizon, it burst into a sparkling host of glowing fragments, each dazzlingly shot over with all the hues of the rainbow."

— According to *Industries*, two novel modifications of sulphur have been recently discovered by Engel. The first, like that proved to exist in Wackenröder's solution, is soluble in water and very unstable. The other is crystalline, soluble in carbon disulphide and chloroform, and polymerizes slowly in the cold, and quickly at a temperature of 100° C., but, unlike prismatic sulphur, which changes on keeping into the octahedral variety, it becomes converted into the white insoluble form which commonly constitutes so large a percentage of the material known as "flowers of sulphur."

— In a new process for the manufacture of phosphorus by electricity used by the Phosphorus Company, at Wednesfield, near Wolverhampton, England, says the London *Engineer*, the raw material and coke are all fed into a specially designed furnace, reduced to vapor by electric heat, and the vapor condensed into marketable phosphorus, the elaborate chemical material hitherto needed in dealing with the raw materials before putting them into the furnace thus being dispensed with. The estimated consumption of phosphorus throughout the world is only two thousand tons per year, used chiefly for match-making. Extensions are contemplated at Wednesfield, which will ultimately, it is anticipated, lead to the company being able to make half this quantity, at that place.

— W. J. Lincoln Adams, editor of the amateur photography department of *Outing*, says in the July number: "The preparations for the twelfth annual convention of the Photographers' Association of America, which will be held this year in Buffalo from July 14 to 17, are actively progressing, and the indications

point to a large attendance. Amateurs as well as professionals are admitted both as exhibitors in the various competitions and as members, with all the privileges of the association. Application for full particulars should be made to Mr. W. A. Davis, secretary, 872 Broadway, New York."

— It seems extraordinary, says the *Illustrated American*, to observe a number of bats in the evening flying back and forth through the trees with remarkable rapidity, but without ever coming in contact with the branches or hurting themselves. Spallanzani, the Italian naturalist, placed a bat in a dark inclosure, across which were stretched a number of threads, crossing and recrossing each other. The bat flew rapidly back and forth, trying to effect its escape, but avoided the threads with as much ease as if they had not been in its way in the least. Whether this curious power was the result of a sixth and unknown sense was long a puzzle to naturalists. To decide this knotty point, Spallanzani resorted to the cruel expedient of blinding a bat, and found that it still flew among the threads without being, to all appearances, any more inconvenienced than if it still had its eyesight.

— Dr. Mueller, of Yackandandah, Victoria, has written a letter to the *Pharmaceutical Journal* in which he states that in cases of snake bite he is using a solution of nitrate of strychnine in 240 parts of water mixed with a little glycerine. Twenty minims of this solution are injected in the usual manner of a hypodermic injection, and the frequency of repetition depends upon the symptoms being more or less threatening, say from ten to twenty minutes. When all symptoms have disappeared, the first independent action of the strychnine is shown by slight muscular spasms, and then the injections must be discontinued unless after a time the snake poison re-asserts itself. The quantity of strychnine required in some cases has amounted to a grain or more within a few hours. Both poisons are thoroughly antagonistic, and no hesitation need be felt in pushing the use of the drug to quantities that would be fatal in the absence of snake poison. Out of about one hundred cases treated by this method, some of them at the point of death, there has been but one failure, and that arose from the injections being discontinued after a grain and a quarter of strychnine had been injected. Any part of the body will do for the injections, but Dr. Mueller is in the habit of making them in the neighborhood of the bitten part or directly upon it.

— At a recent meeting of the Royal Statistical Society, London, a paper was read by Mr. Noel A. Humphreys, secretary of the census office, on the results of the recent census and estimates of population in the largest English towns. The first part of the paper — of which a summary is given in *Nature* of June 18 — was devoted to the consideration of the recently issued results of the census in April last in the twenty-eight large English towns dealt with in the Registrar General's weekly returns. It was pointed out that, although the increase of population within the boundaries of these towns showed an increase of nearly a million in the last ten years, the increase was less, by considerably more than half a million (605,318), than would have been the case if the rate of increase had been the same as in the preceding ten years, 1871-81; and that the rate of movement of population showed striking variations in the different towns. The rate of increase in these twenty-eight towns, it was stated, has pretty constantly declined in recent years, and has fallen with scarcely a break during the last five intercensal periods from 24.3 per cent in 1841-51 to 11 per cent in 1881-91. The percentage of increase within the boundaries of registration in London (practically those of the county of London) declined in the same period from 21.2 to 10.4. The rate of actual decline of population in central London continues to increase, and the rate of increase of the other parts of the metropolis, including even the aggregate outer ring of suburban districts, continues to decline. Examined in detail, the provincial towns show, with few exceptions, the operation of similar laws,—actual decrease in the central portions, and marked decline in the rate of increase in the other portions, the latter being specially noticeable in those towns with comparatively restricted areas. This examination, while showing the marked general decline in the rates of increase in these towns, discloses striking variations in the rates of increase in successive census periods. Mr. Humphreys called

attention to the fact that these striking changes in the rates of movement of population in the large towns interpose the greatest difficulty in estimating, even approximately, their population in intercensal periods. The estimate of population in Liverpool, based upon the rate of increase between 1871 and 1881, exceeded the recently enumerated number by more than 100,000, or by 20 per cent; while in Salford the percentage of overestimate, by the same method, was 26 per cent. Thus the recent birth-rates and death-rates in these two towns have been underestimated by no less than a fifth and a fourth, respectively. The various methods that have been at different times suggested for estimating the population of towns in intercensal years, in substitution of Dr. Farr's method, still used by the Registrar-General's department, were severally considered, and it was shown that no hypothetical method yet devised affords reasonable promise of satisfactory results. It was therefore urged that a quinquennial census could alone supply a remedy for the present difficulty, which threatens to impair the public faith in death-rates, the failure of which would most seriously hinder and imperil the health progress of the country.

— Mail advices from Australia state that an exploring expedition, under the auspices of the Geographical Society of Australia, and equipped through the liberality of Sir Thomas Elder, was ready to start from Adelaide in April. The intention is to explore some of the still unknown portions of Australia. The leader of the expedition is Mr. David Lindsay, the Australian traveller, who is well qualified for the post. The second in command is Mr. F. W. Leech of Adelaide. The other members are Mr. L. A. Wells, surveyor; Dr. F. J. Elliott, medical officer and photographer; Mr. V. Streich, geologist; and Mr. R. Helms, natural history collector; besides four other gentlemen as assistants. Forty-four camels with four Afghan drivers, and a native guide, form part of the expedition.

— At a meeting of the Royal Meteorological Society, London, on June 17, Mr. A. J. Hands gave an account of a curious case of damage by lightning to a church at Needwood, Staffordshire, on April 5, 1891. The church was provided with a lightning conductor, but Mr. Hands thinks that when the lightning struck the conductor a spark passed from it to some metal which was close to it, and so caused damage to the building. Mr. W. Ellis read a paper on the mean temperature of the air at the Royal Observatory, Greenwich, as deduced from the photographic records for the forty years from 1849 to 1888, and also gave some account of the way in which, at different times, Greenwich mean temperatures have been formed. Mr. Ellis also read a paper on the comparison of thermometrical observations made in a Stevenson screen with corresponding observations made on the revolving stand at the Royal Observatory, Greenwich. From this it appears that the maximum temperature in the Stevenson screen is lower than that of the revolving stand, especially in summer, and the minimum temperature higher; while the readings of the dry and wet bulb thermometers on both the screen and the stand, as taken at stated hours, agree very closely. Mr. W. F. Stanley exhibited and described his "phonometer," which is really a new form of chronograph designed for the purpose of ascertaining the distance of a gun from observations of the flash and report of its discharge, by the difference of time that light and sound take in reaching the observer. The instrument can also be used for measuring the distance of lightning by timing the interval between the flash and the report of the thunder. A paper was also read by Mr. A. B. MacDowell, on some suggestions bearing on weather prediction.

— The agricultural experiment station at Cornell University has made a series of investigations on the loss in stable manures by exposure in open barnyards, the results of which are summarized in Bulletin No. 27 of that station. Horse manure was saved from day to day until a pile of two tons had been accumulated. Cut wheat straw was used plentifully as bedding, the relative amount of straw and manure being 3,319 pounds of excrement and 681 pounds of straw. Chemical analysis showed that one ton of this fresh manure contained nearly ten pounds of nitrogen, seven and one-half pounds of phosphoric acid, and eighteen pounds of potash, making its value \$2.80, if these constituents be valued at the

same rate as in commercial fertilizers. The pile of manure thus made was put in a place exposed to the weather, and where the drainage was so good that all the water not absorbed by the manure ran through and off at once. It remained exposed from April 25 to Sept. 22, 1890, at which time it was carefully scraped up, weighed, and a sample taken for analysis. It was found that the 4,000 pounds had shrunk to 1,730 pounds during the five months, and analysis showed that this 1,730 was less valuable, pound for pound, than the original lot of manure. It had not only lost by leaching, but by heating or "fire fanging" during periods of dry weather, and the value of the pile of 4,000 pounds had shrunk from \$5.60 to \$2.12, a loss of 62 per cent. In summing up the results of this experiment, Director Roberts says: "It seems safe to say that under the ordinary conditions of piling and exposure, the loss of fertilizing materials during the course of the summer is not likely to be much below fifty per cent of the original value of the manure." Further experiments showed that the liquid manure from a cow is worth as much per day as the solid manure, and that the combined value of the two is nearly ten cents per day, if valued at the same rate as commercial fertilizers; that from a horse is valued at seven cents per day, that from a sheep at one and one-half cents, and that from a hog at one-half cent. Director Roberts is careful to explain that these values will have to be modified to suit individual circumstances. What he means is, that, if farmers can afford to buy commercial fertilizers at current prices, then the manures of the farm are worth the prices given. The bulletin closes with plans illustrating a cheap manure shed, under which manure may be saved with practically no loss.

— Considerable progress is being made by the government of Japan in its survey operations, as we learn from the *Proceedings of the Royal Geographical Society* for June. A map on the scale of 1:200,000 was commenced sixteen years ago, and is now published (in seventy-seven sheets) for the whole of the islands except Yezo. This is, however, considered merely as a provisional publication, being based on Japanese methods of work, and therefore not to be relied on for accuracy. A modern survey was commenced eleven years ago, with triangulation of four orders, and depending on some five base-lines. Copper-plate, photogravure, and lithography are employed in the reproduction of these maps, and few if any Europeans are employed. The work appears to be excellent. Only a small proportion is completed, and it will be many years before the whole is finished. About three hundred of the published sheets can now be bought: the scale is 1:20,000. A map on a scale of 1:100,000 is also being prepared, based on the 1:20,000 map, but no sheets are yet for sale. The names on these maps are in Japanese characters. In the Geological Survey of Japan reconnaissance map, Roman characters are used, and 1:400,000 is the scale.

— At a meeting of the Geographical Society of Paris, on March 20, the Minister of Public Instruction communicated a report by MM. Rousson and Willems upon their scientific mission to Tierra del Fuego, a condensed translation of which appears in the *Proceedings of the Royal Geographical Society* for June. The region explored by them is comprised within 52° 30' and 53° 30' south latitude, and 68° 15' and 70° 30' west longitude. This part of the country is traversed by a chain of mountains running from Cape Bogueron, where it rises abruptly to over 1,650 feet, to Cape Espiritu-Santo. Great lagoons, forming small rivers, extend into the immense plains. The watercourses are very numerous, but many of them are dried up in summer. The Rio del Oro, which is the most important stream of the northern part of the island, empties itself into the Bay of Felipe. The climate is very variable, according to the locality. The travellers did not suffer from cold at all during their journeys, but two men were frozen to death at Porvenir. The climate, however, is not so rigorous as supposed. The lowest temperature recorded by the travellers was 43° F., and the maximum 69°, the nights being always very cold. Winds are very frequent, the most violent being those from the west, which attain a velocity of seventy miles an hour. During the three most rigorous months of the year, only six days of rain and two of snow were registered, but on the higher hills much more

snow fell. The winter was stated by the natives to have been exceptionally mild. The Indians inhabiting the north of the island are the Onas. They are very tall, and sometimes attain over six and a half feet in height. Their skin is copper-colored and oily; their face is oval, forehead narrow, and their long hair falls down over their shoulders. Their eyes are small, and eyebrows well defined; nose slightly aquiline, cheek-bones prominent, mouth very large, with small yellowish teeth. They are very muscular and strong, and are great warriors, being continually in conflict with the Indians of the west and south. It is an error to suppose that they are cannibals, or that they burn their corpses. Several places were found where the Indians had buried their dead. They believe in a spirit whom they call "Waliche," and to whom they refer all good and evil. The north of Tierra del Fuego is completely destitute of trees. The only shrubs found there are the calafate, the romorille, and the mata-nigra. Quadrupeds are few, but birds of all kinds plentiful. Magnetic iron can be obtained in all parts in great quantity, and gold is also found at some points, but often at very great depths. The native population of the north may be estimated at not more than three hundred. The whole mainland north of the Straits of Magellan, which ten or twelve years ago was unoccupied, has in recent years become covered with small farms, where sheep and horned cattle are reared, and these farms have prospered to such an extent that the vast region they occupy is even now too small. The cordillera of the Andes bars any extension towards Chili, so that it may be concluded that the archipelago of Tierra del Fuego will, in the near future, receive the overflow of Patagonia. There is already on the island a model farm where nearly twenty thousand sheep and over sixty thousand horned cattle are reared.

— "I have never expressed any opinion to my professional brethren on the fundamental value of Koch's method, simply because I do not know how such an opinion can be formulated," said Professor Virchow recently in the Prussian House of Deputies, during a debate on granting additional funds for the Koch Institute. "I have only communicated a series of personal observations," he continued, "which have indeed been of service in directing attention to one part of the question, and have especially enforced the need for calm and objective study that is so requisite in these difficult subjects. Dr. Graf [a previous speaker] is still steeped in optimism. He has no right to speak of the importance of the matter until he has proved it, and it is, in fact, not proved. But it would be just as foolish if we, as pessimists, were to say, 'The matter is of no importance whatever; it is only a poison, a noxious substance.' The question has, in fact, been developed in unexpected directions, leading in many quarters to the hope that very striking results can be produced by these powerful measures — a hope we cannot yet say has been annihilated. As a matter of fact, there is not a single case known in which any form of tuberculosis has been cured by this means. All cases which were for a while regarded as cured have afterward been found to relapse. The improvements were merely temporary, such as often occur under other treatment. On the other hand, there is no doubt whatever that many serious dangers have been revealed, with regard to which I may claim some merit for myself. Nevertheless, from what I have just said, no doctor who feels called upon to make further trial of the remedy could by any possibility lay himself open to prosecution. The original trials were, in point of fact, made after results had been obtained in animals which seemed to justify the expectations that were raised regarding the discovery."

— Theo. B. Comstock, late of the Geological Survey of Texas, is now director of the University of Arizona, at Tucson.

— Professor A. T. Wood, formerly of the University of Illinois, has accepted a position as professor of mechanical engineering in the Washington University, St. Louis, Mo.

— Dr. John I. Northrop of Columbia College has died as the result of burns received June 25. Dr. Northrop, with two assistants, had gone down in the cellar of one of the buildings to supervise the placing of some newly acquired specimens in alcohol, when an explosion occurred and all three were severely burned. Dr. Northrop was about thirty years old and was highly esteemed.